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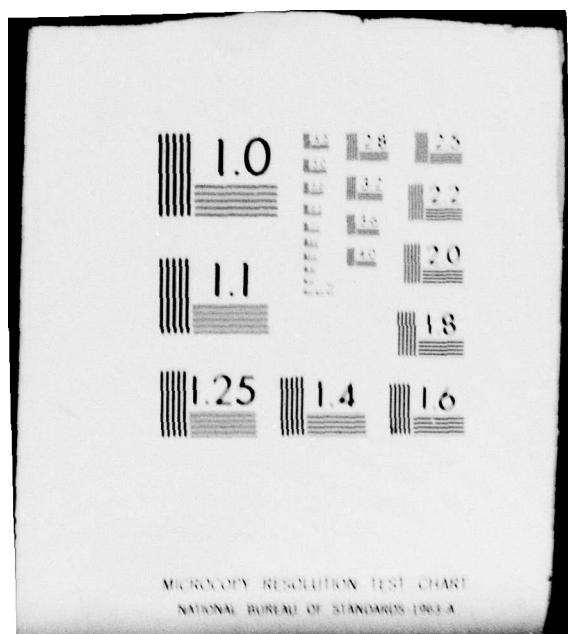
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6 Preliminary Report on ATLANTIS  
Cruise A-242 Mediterranean Sea  
(Port Said, Egypt to Cadiz, Spain)  
July 1, 1958 - August 4, 1958

By Davis A. Fahlquist

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Submitted to Bureau of Ships under Contract NObsr-72521,  
and Office of Naval Research under Contracts Nonr-1367(00)  
and Nonr-2196(00)

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*Paul M. Fye*  
Paul M. Fye, Director

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## INTRODUCTION

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During this reporting period,

During the period July 1 - August 4, 1958, the following studies were carried out aboard R/V ATLANTIS in the Eastern and Western Mediterranean Sea: (1) continuous echo sounding profiles, (2) fifteen seismic refraction profiles, and (3) twelve hydrographic stations. The seismic refraction stations were occupied in company with R/V VEMA of the Lamont Geological Observatory. In addition ATLANTIS served as the shooting vessel for sound transmission studies recorded aboard USCGC YAMACRAW. Eight sound transmission profiles and one seismic reflection study were completed jointly with YAMACRAW.

The major portion of these studies were supported by the U. S. Navy under Contract NObsr-72521. Additional support was granted by the Office of Naval Research under Contracts Nonr-1367(00) and Nonr-2196(00). Biological studies were supported by the IGY Program Committee and the National Science Foundation under grant NSF Y/9.5/80.

A detailed chart of the ATLANTIS track showing all stations occupied will be found in Figure 1. A brief discussion of the scientific studies will be found in Part V of this report.

## SCIENTIFIC PERSONNEL

### Port Said to Alexandria (June 30 - July 4, 1958)

Antoine, John	Lamont Geological Observatory
Fahlquist, Davis A.	WHOI*
Graham, John W.	WHOI* (Chief Scientist)
Risebrough, Robert	WHOI*
Stetson, Thomas	WHOI
Witzell, Warren E.	WHOI

### Alexandria to Naples (July 7 - July 18, 1958)

Antoine, John	Lamont Geological Observatory
Bradshaw, Alvin	WHOI
Edwards, Richard	WHOI (Chief Scientist)
Fahlquist, Davis A.	WHOI*
Hahn, Jan	WHOI
McGill, David	WHOI
Wilde, Donald	WHOI*

Naples to Cadiz (July 23 - August 4, 1958)

Antoine, John	Lamont Geological Observatory
Edwards, Richard	WHOI (Chief Scientist)
Fahlquist, Davis	WHOI*
Hahn, Jan	WHOI
McGill, David	WHOI
Wilde, Donald	WHOI*

\*Summer students at WHOI

Fahlquist a graduate student at MIT

Risebrough a graduate student at Harvard

Wilde an undergraduate student at Northeastern University

NARRATIVE DESCRIPTION OF CRUISE

1. Port Said to Alexandria (1 July - 4 July)

R/V ATLANTIS left Port Said on the morning of July 1 enroute to Alexandria having just passed through the Suez Canal after seven weeks in the Red Sea and Indian Ocean. Working in conjunction with R/V VEMA, three seismic stations were occupied between July 1 and July 4. Two of these profiles were located in shallow water on the Nile Delta, the third in deep water to the north of the delta.

Early on the morning of July 4, the ATLANTIS hove to north of Alexandria in 100 fathoms of water and several shrimp try-net lowerings were made. Biological collections were made after each lowering. ATLANTIS docked in Alexandria Harbor at 1100, July 4.

Dr. Graham and Messrs. Stetson, Risebrough, and Witzell left the ship in Alexandria. The scientific personnel joining ATLANTIS in Alexandria were Mr. R. S. Edwards, as chief scientist, and Messrs. Bradshaw, McGill, Wilde and Hahn. Messrs. Antoine and Fahlquist remained to assist in the Mediterranean studies.

2. Alexandria to Naples (7 July - 18 July)

ATLANTIS departed from Alexandria at 1200, July 7. During the next eleven days five seismic refraction stations and six hydrographic stations were occupied in the Eastern Mediterranean Sea. McGill and Hahn carried out the hydrographic studies. Antoine and Fahlquist, assisted by the rest of the scientific party, continued to make the seismic studies.

Seismic refraction profiles were completed northwest of Crete (Prof. #188, 189) in the deep water of the Ionian Basin between Crete and Sicily (Prof. #192). On July 16 ATLANTIS joined YAMACRAW in the Tyrrhenian Sea northwest of Sicily. ATLANTIS acted as the shooting vessel for two sound transmission runs and a single seismic reflection profile, all recorded aboard YAMACRAW. ATLANTIS arrived in Naples on 18 July.

During this leg of the cruise, some difficulties were experienced with the electronic equipment. A synchronous drive motor on the precision graphic recorder (PGR) was replaced and the EDO power supply was overhauled. The PGR continued to run fairly satisfactorily for the remainder of the time spent in the Mediterranean. One suitcase amplifier failed and was replaced with a spare unit. The seismic equipment was overhauled in Naples and performed satisfactorily for the remainder of the cruise. The BT winch showed increasing signs of wear despite efforts to repair it. Consequently, bathy-thermographic recordings were made only during the seismic profiling.

3. Naples to Cadiz (23 July - 4 August)

Alvin Bradshaw left the ship in Naples. The rest of the scientific personnel remained aboard for this leg of the cruise. ATLANTIS sailed from Naples on July 23. Six seismic stations and six hydrographic stations were occupied in the ensuing eleven days. Seismic refraction stations were occupied in the Tyrrhenian Basin (Prof. #193), in deep water midway between Sardinia and the Balearic Islands (Prof. #194), northeast of the Balearic Islands (Prof. #195), west of the Balearic Islands (Prof. #196, 197), in the Algiers Provencal Basin (Prof. #198), and in the Alboran Basin (Prof. #199). With two exceptions, the hydrographic stations were occupied in conjunction with the seismic stations. No hydrographic stations were made to the west of the Balearic Islands. However, two stations were occupied at the eastern and western approaches to the Straits of Gibraltar.

## SCIENTIFIC STUDIES

### 1. Echo Sounding

Continuous echo sounding profiles were made for the entire cruise. Representative fathomgrams are shown (fig. 2) for the rapid rise from the Ionian Basin up to the platform northwest of Crete. In addition to bottom topography, the scattering layer was observed on the PGR records on numerous occasions. The observations of the scattering layer (fig. 2) in the deep basin of the western Mediterranean show interesting fluctuations of several fathoms amplitude and warrant further study. Attempts to obtain subbottom reflections by using a shortened pulse and high resolution were unsuccessful.

### 2. Seismic Refraction

The seismic studies were designed to measure the sound velocity structure of the materials underlying the Mediterranean Sea. Eventually these results will be interpreted in terms of geologic structure and the tectonic history of the region. The profiles are plotted on the track chart and the coordinates of the end points of the profiles are listed in Table #1.

It is doubtful whether any basement velocities were obtained on the Nile Delta. However, it is hoped that the data will provide a reasonable estimate of the minimum sediment thickness underlying the delta. The remaining profiles in the eastern Mediterranean were relatively short with an average length of 18-20 miles. Northwest of Crete refraction arrivals became very weak at a range of 18 miles. This is thought to be indicative of the complex geologic structure of the region.

In the western Mediterranean considerably longer profiles were obtained. Three profiles (#195, 198 and 199) were in excess of 30 miles in length; the remainder varied from 18 to 25 miles. Apparent velocities in excess of 7 km. / sec. were obtained on profiles #193, 195, 198 and 199. The fifteen profiles obtained are too widely scattered to be considered much more than a preliminary survey. However, in combination with magnetic studies made aboard R/V VEMA and seismic reflection studies made aboard YAMACRAW, it is hoped that some tentative indications may be obtained concerning the structure of the western Mediterranean Basin.

TABLE #1 Location of Seismic Profiles  
(Coordinates of the end points of the profile are given)

Profile #	Date	Position
185	1 July	32°01'N, 31°55'E      32°01'N, 31°35'E      Nile Delta
186	2 July	33°30'N, 30°34'E      33°51'N, 30°26'E      Deep water north of Nile Delta
187	3 July	33°00'N, 30°09'E      32°45'N, 30°00'E      Nile Delta
188	10 July	36°04'N, 23°45'E      35°52'N, 23°30'E      Passage northwest of Crete
189	11 July	35°36.5'N, 22°20'E      35°47'N, 21°52'E      West of Crete
190	12 July	35°42'N, 18°30'E      35°42'N, 18°08'E      Deep water of Ionian Basin
191	14 July	36°20'N, 16°58'E      36°22'N, 14°41'E      Banks southeast of Sicily
192	15 July	37°05'N, 11°45'E      37°19'N, 11°38'E      Straits of Sicily
193	24 July	39°40'N, 12°28'E      39°37'N, 11°49'E      Deep water of Tyrrhenian Basin
194	26 July	38°32'N, 6°52'E      39°08'N, 6°39'E      Western Mediterranean Basin west of Sicily
195	27 July	41°10'N, 5°01'E      41°40'N, 5°01'E      Northeast of Balearic Islands
196	29 July	39°43'N, 1°04'E      39°20'N, 0°58'E      West of Balearic Islands
197	30 July	39°05'N, 0°49'E      38°47'N, 0°40'E      West of Balearic Islands
198	30 July	37°51'N, 0°46'E      37°25'N, 0°32'E      Algiers Provencal Basin
199	31 July	35°58'N, 1°39'W      35°49'N, 2°32'W      Alboran Basin

<sup>1</sup> Coordinates are subject to later revision when detailed navigation plots are available.

### 3. Hydrographic Studies

The hydrographic stations are shown on the track chart and the coordinates tabulated in Table #2. The hydrographic studies were designed to supplement the data obtained on ATLANTIS cruise A-151<sup>1</sup> in 1947-48. Particular emphasis was placed on obtaining additional hydrographic stations in deep water. The hydrographic studies were made by McGill and Hahn. Due to losses of equipment earlier in the cruise it was necessary to make multiple casts for the deeper hydrographic stations. Oxygen and inorganic phosphate analyses were made by McGill immediately after each lowering. Additional water samples were collected for salinity and total phosphate analyses. These analyses will be made at Woods Hole.

### 4. Sound Transmission Profiles

During the sound transmission studies ATLANTIS served only as the shooting ship. The coordinates of the end points of the profiles are shown in Table 3.

### 5. Other Observations and Collections

Two large samples of surface water to be used as standards in the salinometer were collected in the eastern Mediterranean for Karl Schleicher.

Biological collections were made after two try-net hauls, the first in 100 fathom water north of Alexandria, and the second on the shallow banks southeast of Sicily. The swordfish caught in the western Mediterranean were examined by Dr. Richard H. Backus, and pertinent collections of stomach contents of the two fish were made.

---

1

Pollak, M. J. et al. Preliminary Report on the ATLANTIS cruise 151 to the Mediterranean Area. September 1948.

TABLE #2 Hydrographic Stations

	Date	Position
#5647	8 July	32°38'N, 27°46'E
#5648	11 July	35°47'N, 21°52'E
#5649	12 July	35°41'N, 18°11'E
#5650	14 July	36°11'N, 15°06'E
#5651	14 July	36°30'N, 13°15'E
#5652	15 July	37°04'N, 11°45'E
#5653	26 July	38°46'N, 6°54'E
#5654	27 July	41°36'N, 5°00'E
#5655	30 July	37°24'N, 0°32'E
#5656	31 July	36°02'N, 1°42'W
#5657	1 August	35°58'N, 4°11'W
#5658	2 August	35°54'N, 6°32'W

Woods Hole Oceanographic Institution  
Preliminary report on ATLANTIS Cruise A-242  
Mediterranean Sea (Port Said, Egypt to Cadiz,  
Spain) July 1, 1958 - August 4, 1958, by Davis A.  
Fahlquist. Reference no. 59-6. September, 1959.

5 p.

TABLE #3 Sound Transmission and Reflection Profiles - ATLANTIS  
shooting for YAMACRAW

		Date	Position
A242	Y-1	Sound Transmission	38°55'N, 12°18'E
	Y-2	Reflection Profile	39°31'N, 13°00'E
	Y-3	Sound Transmission	40°06'N, 13°40'E
	Y-4	Sound Transmission	39°37'N, 11°45'E
	Y-5	Sound Transmission	38°48'N, 6°45'E
	Y-6	Sound Transmission	41°40'N, 5°00'E
	Y-7	Sound Transmission	37°19'N, 0°25'E
	Y-8	Sound Transmission	36°22'N, 3°07'W
	Y-9	Sound Transmission	36°11'N, 4°29'W
			38°59'N, 12°10'E
			39°38'N, 12°52'E
			39°49'N, 13°31'E
			39°30'N, 11°28'E
			39°14'N, 6°24'E
			41°29'N, 4°44'E
			37°08'N, 0°07'E
			36°22'N, 3°33'W
			36°05'N, 4°58'W



FIG. I

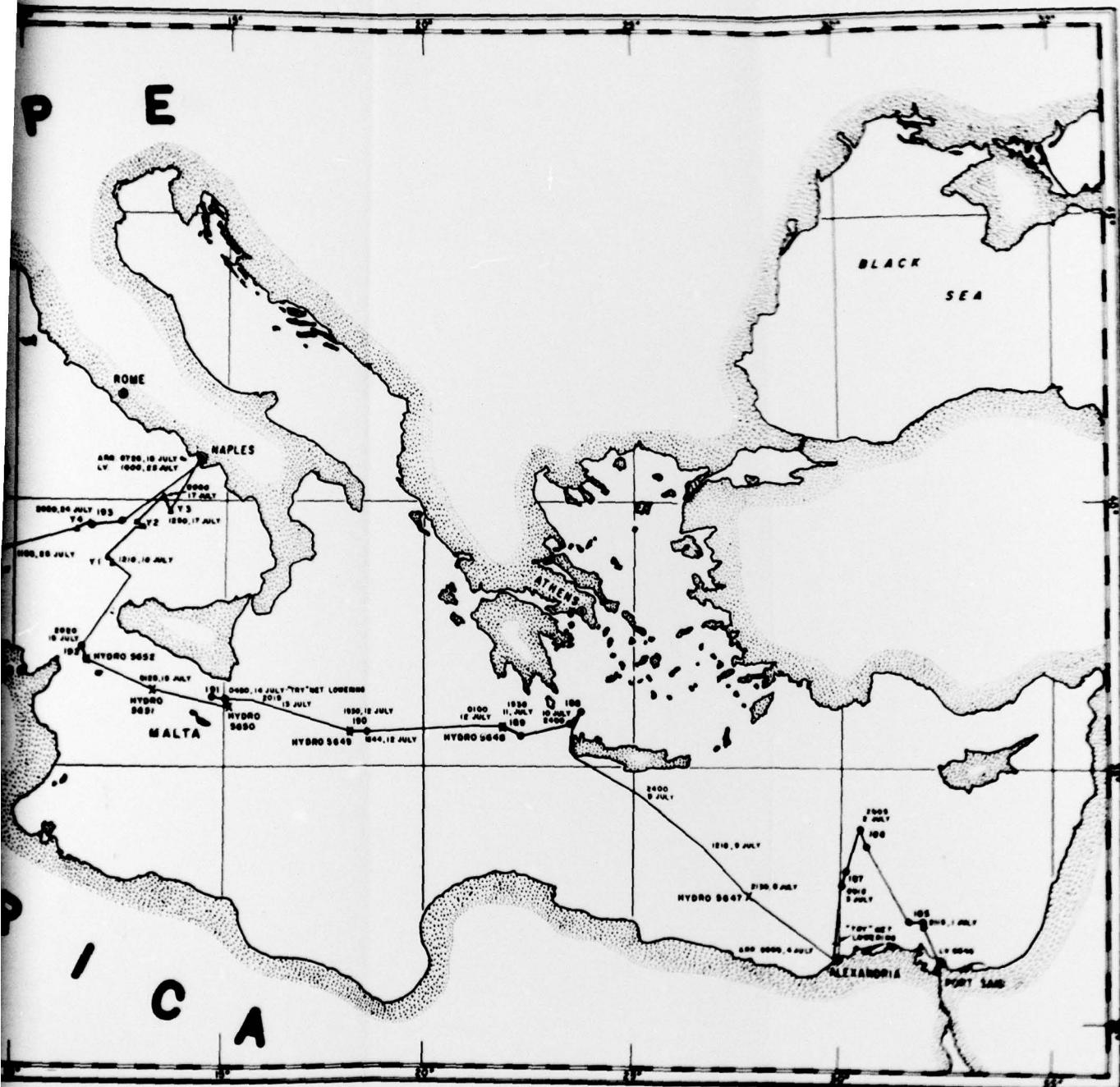
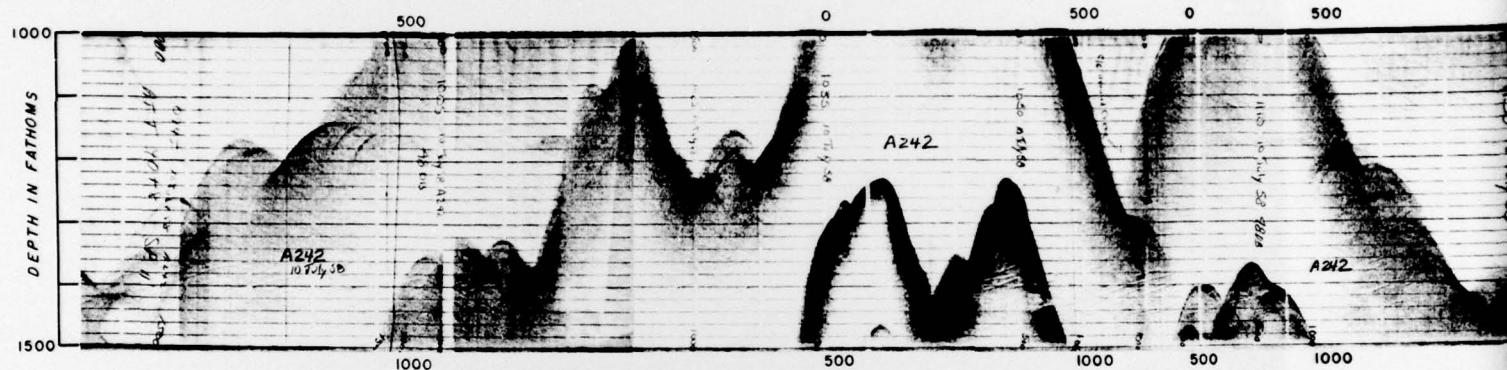
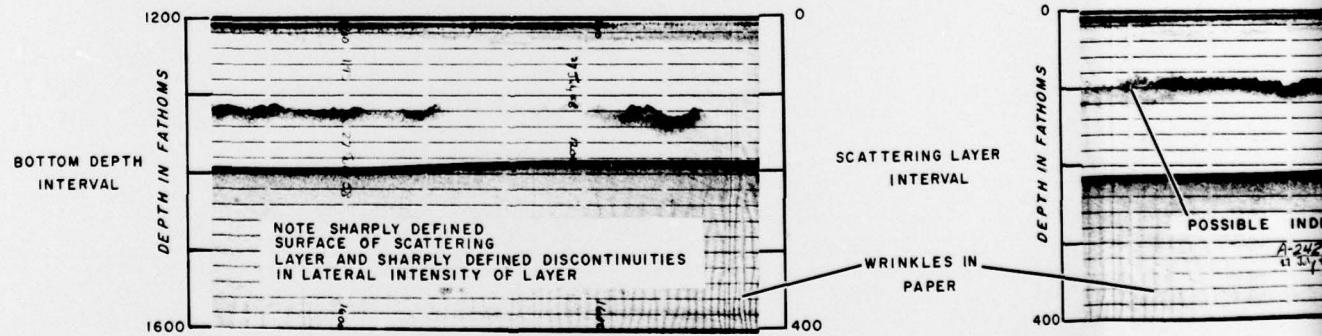


FIG. I

A-242



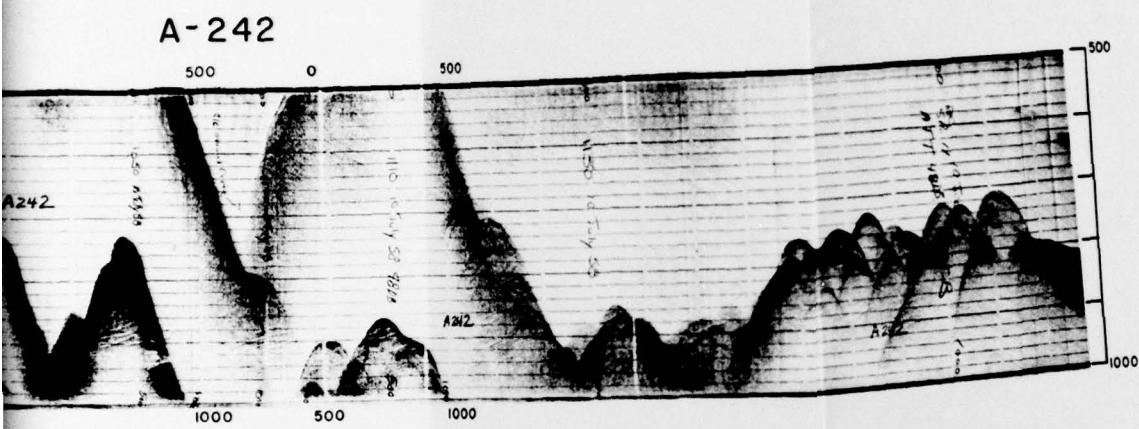
TOPOGRAPHY OF SEA FLOOR  
NORTHWEST OF CRETE  
LAT.  $35^{\circ} 35'$  N. LONG.  $23^{\circ} 30'$  E. APPROX.



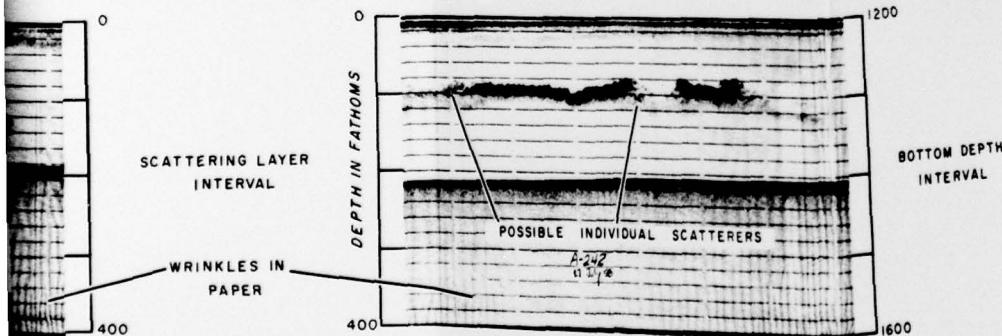
SCATTERING LAYER OBSERVED  
IN WESTERN MEDITERRANEAN SEA  
LAT.  $40^{\circ} 55'$  N. LONG.  $5^{\circ} 10'$  E. APPROX.

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FIG. 2



TOPOGRAPHY OF SEA FLOOR  
NORTHWEST OF CRETE  
LAT.  $35^{\circ} 35' N$ . LONG.  $23^{\circ} 30' E$ . APPROX.



SCATTERING LAYER OBSERVED  
IN WESTERN MEDITERRANEAN SEA  
LAT.  $40^{\circ} 55' N$ . LONG  $5^{\circ} 10' E$ . APPROX.

FIG. 2

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